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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/528,362

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Teiji Suzuki

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EXAMINER

YANG, JIE

ART UNIT

PAPER NUMBER

1793

NOTIFICATION DATE

DELIVERY MODE

06/23/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/528,362	Applicant(s) SUZUKI ET AL.	
	Examiner JIE YANG	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 6-11 is/are pending in the application.
- 4a) Of the above claim(s) 7-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/13/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This is to acknowledge the receipt of "applicant argument/remarks" filed on 2/28/2008. Claims 7-11 are withdrawn as non-elected claims, claims 4 and 5 are cancelled, claim 1 have been amended from original claims, Claims 1-3, and 6 are pending in application.

Status of the Precious Rejection

Previous rejection of claims 1-3 under 35 U.S.C. 103(a) as being unpatentable over Tahara et al (US 4,975,147, thereafter, US'147) have been withdrawn in view of the applicant's arguments/remarks filed in 03/20/2008 to the claims. However, upon further consideration, a new ground(s) of rejection is made (see below).

Previous rejection of claim 6 under 35 U.S.C. 103(a) as being unpatentable over US'147 in view of US'542, JP'761 and JP'214, and further in view of Dawes et al (US 4,904,316, thereafter US'316) is maintained.

Claims Objection

Claim 6 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. In the instant case, claim 6 depends on the claim 5, which is cancelled in view of the applicant's arguments/remarks filed in 02/28/2008. For the examining purpose, claim 6 is assumed depending on the claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tahara et al (US 4,975,147, thereafter, US'147) in view of Imai et al (US 6,631,542 B1, thereafter US'542), Kokubu (JP 62-270761, thereafter, JP'761) and Kitano Kenzo et al (JP 2000-087214, thereafter JP'214).

US'147 is applied to the claims 1-3 for the same reason as stated in the previous rejection dated 3/20/2008.

Regarding the new added limitations in the claim 1, US'147 does not explicitly state the processing time ranging from 30 to 120 min. However, nitriding temperature and time are recognized as result-effective variables in term of thickness of nitrided film, which is evidenced by US'542. US'542 teaches nitriding maraging steel rings at a temperature range of 450°C to 500°C for 30 to 120 min. (Claims 1 and 7 of US'542), which has the same nitriding temperature and time ranges as claimed in the instant claim. Therefore, it would have been obvious to one skilled in

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the art to have optimized nitriding temperature and time, for example, 450°C to 500°C for 30 to 120 min. as claimed in the instant claim in order to carry out nitriding in a stable atmosphere (col.3, lines 9-13 of US'542). See MPEP 2144.05 II.

US'147 does not explicitly state, changing nitriding gas during the nitriding process; nitriding with first mixed gas consisting of 50 to 90% by volume of ammonia, 0.1 to 0.9% by volume of oxygen and balanced by substantially nitrogen; and after one third to one half of the processing time, replacing nitriding gas to 0 to 25% by volume ammonia with balanced with nitrogen. However, changing nitriding gas, adding oxygen in mixture of ammonia and nitrogen gas, and designing the ammonia percentage in the nitriding gas are result-effective variables in term of thickness and uniformity of resulting nitriding layers, which are evidenced by JP'761. JP'761 teaches changing nitriding gas atmosphere during a nitriding process, for example, using different nitriding gas atmosphere in nitriding periods 3 to 7 (Fig.2 of JP'761). JP'761 teaches the nitriding gas is comprised of ammonia, oxygen and nitrogen. The content of ammonia is 40 to 60 Vol.% and the contents of oxygen is 0.2-3 Vol.% (Abstract of JP'761), which overlaps the first mixing gas (ammonia, oxygen and nitrogen) ranges as claimed in the instant claim 1. Therefore, it would have been obvious to one skilled in

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the art to change nitriding gas atmosphere during nitriding process; to adjust the time period of different nitriding steps; and to choose first mixing gas consisting of 50 to 90% by volume of ammonia, 0.1 to 0.9% by volume of oxygen and balanced by substantially nitrogen as claimed in the instant claim as demonstrated in JP'761 in process of US'147 in order to obtain desired surface hardness and hardness distribution of nitriding layers (Abstract of JP'761). See MPEP 2144.05 II. Regarding the second mixture of nitriding gas, JP'214 teaches a method to form a hard nitriding hardened layer on the surface of maraging steel (Abstract of JP'214). JP'214 teaches the concentration of NH_3 in a nitriding atmosphere is in the range 5 to 30% by vol., which overlaps the range of nitriding gas consisting 0 to 25% by volume ammonia as claimed in the instant claim. JP'214 teaches the similar coated fluoride film and nitriding process on the same maraging steel at the similar temperature (400 to 500°C) for the similar nitriding time (15 min. to 5 hrs.) as disclosed in the instant invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the nitriding with a second nitriding gas with 0 to 25% by volume ammonia as demonstrated by JP'214 in US'147's process in view of US'542 and JP'761, because JP'214 teaches the steel's property of high fatigue strength and wear resistance

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can be obtained by such a nitriding process (Abstract of JP' 761) .

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over '147 in view of US'542, JP'761 and JP'214, and further in view of Dawes et al (US 4,904,316, thereafter US'316).

US'147 in view of US'542, JP'761 and JP'214, and further in view of US'316 is applied to the claim 6 for the same reason as stated in the previous rejection dated 3/20/2008.

Response to Arguments

In the remark, the Applicant argues:

1) the prior art does not disclose replacing the nitriding gas atmosphere during nitride treatment and using both a first mixed gas and a second mixed gas as recited in claim 1.

2) the cited references in combination do not disclose or suggest a method of nitriding performed by replacing a first mixed gas with a second mixed gas when one-third to one half of processing time has elapsed as presently claimed.

3) the present invention demonstrates unexpected results over the prior art.

In response,

Regarding the arguments 1 and 2, please refer to the new ground rejection for the amended claim 1, Tahara (US'147) in view of Imai (US'542), Kokubu (JP'761) and

Kitano Kenzo (JP'214) teaches the limitations of nitriding process as recited in the instant claims. The detail discussion and motivation for the combination of the cited references could refer to the above rejections for the instant claims.

Regarding the argument 3, the Examiner notices there is no data to support the discussions related to the unexpected result in the instant remarks, for example, there is no correlated data to show the relationship between the hardness distributions of nitride layer with the toughness of the materials. Compared the Fig.3 (a) with the Fig.(3b) in the instant application, there is no significantly difference between these two hardness distribution curves. The applicant claims a time period—"replacing a first mixed gas with a second mixed gas when one-third to one half of the processing time has elapsed", However it is not clear that Fig.(3a) comes from which test point and what is the toughness improvement compared with the conventional method. Therefore, this asserted unexpected result does not add patentable weight to the instant application.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jie Yang whose telephone number is 571-2701884. The examiner can normally be reached on IFP.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-2721244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JY
/Roy King/
Supervisory Patent Examiner, Art Unit 1793